Residential Energy Efficiency Requirements

The HVAC contractor shall size heating/cooling equipment and appliances in accordance with ACCA Manual S, based on building loads calculated per ACCA Manual J, 8th Edition.

Manual J and S reports shall be submitted with plans for new residences. Heat loss calculations using approved software (Wrightsoft, Adtek, Elite, Carmelsoft, Avenir HeatCAD/LoopCAD, Cool Calc, or Florida Solar Energy Center's Energy Gauge) are required. Calculations shall show the size, make, model, and BTU's/SEER Rating (A/C) for furnaces, air conditioners and boilers. Electric baseboard heater manufacturer's specs must be provided. Duct systems for heating, cooling and ventilation shall be sized in accordance with ACCA Manual D.

The following thermal design parameters shall be used for Larimer County:

Winter Outdoor Design Dry-bulb (4^0F) Winter Indoor Design Dry-bulb (72^0F)
Summer Outdoor Design Dry-bulb (91^0F) Summer Indoor Design Dry-bulb (75^0F)
Summer Design Wet-bulb (62^0F) 6368 Degree Days Heating 479 Degree Days Cooling

Please indicate which of the following four 2021 code options you are choosing:

1) **Prescriptive Package:** see chart on reverse side for insulation and glazing requirements. Decide if you will be installing 2x6 stud walls with R-30 insulation or using footnote (f), and make sure that detail is on your plans. All window NFRC (U-factor/SHGC) labels must be left on windows until the insulation inspection has been approved.

2) **Total UA Alternative (REScheck)**: Provide REScheck Compliance Certification showing you passed the 2018 or 2021 IECC; an architect or HVAC contractor may be able to assist you. Heating/AC equipment to be sized per Manual J & S, to be provided with REScheck report. Input data must match both reports and building plans. Free software is at energycodes.gov (click on REScheck). The home must also comply with maximum Solar Heat Gain Coefficient requirements of Table N1102.1.2 and maximum fenestration U-factors of Section N1102.5.

3) **Total Building Performance (HERS)** done by a certified energy rater: go to resnet.us to find certified raters. Larimer County allows a $100 rebate on permit fees if a certified energy rater inspects and documents with a compliance report that the home passes the 2021 residential requirements. The home must also comply with Table N1105.2 requirements.

4) **Energy Rating Index (ERI):** The rated design shall have an ERI less than 55 compared to the *reference design*, using approved software tools in accordance with RESNET/ICC 301, with compliance verification documentation provided by an approved third party. In addition, the home must comply with IRC Table N1106.2 requirements.

Additional Energy Efficiency Package Selected (see page 2): _____

Name of Air Leakage Tester/Testing Company (see page 2): _____

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Fenestration U-Factor[b, i]	Skylight[b] U-Factor	Glazed Fenestration SHGC [b, e]	Ceiling R-Value	*Wood Frame Wall R-Value[f, g]*	*Mass Wall R-Value[h]*	*Floor R-Value*	*Basement[c, f, g] Wall R-Value*	Slab[d] R-Value & Depth	Crawl Space[c, f, g] Wall R-Value
.32	.55	.40	**R-60**	30 or 23+3ci or 20+5ci or 13+10ci or 0+20ci	13/17	30	19 or 13+5ci or 0+15ci	10ci, 30" [e]	19 or 13+5ci or 0+15ci

For SI: 1 foot = 304.8 mm. ci = continuous insulation

a. R-values are minimums. U-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not less than the R-value specified in the table.
b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestrations.
Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13 + 5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab-edge insulation R-value for slabs. as indicated in the table. The slab edge insulation for heated slabs shall not be required to extend below the slab.
e. 30" (762 mm) or top of footings or bottom of monolithic slab, whichever is greatest.
f. Class 1 vapor retarders shall not be installed on the interior of framed walls where exterior ci value is less than R-7.5
g. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation.
h. Mass walls shall be in accordance with Section N1102.2.5. The second R-value applies where more than half of the insulation is on the interior of the mass wall.

Other Noteworthy 2021 Residential Energy Code Requirements

- All applications must specify one **additional energy efficiency package** per IRC Section N1108: enhanced envelope performance, more efficient HVAC equipment, more efficient water heater, more efficient ductwork, or maximum 3.0 ACH50 air leakage AND installation of a Heat Recovery Ventilator or Energy Recovery Ventilator.
- You must specify the **air leakage tester** you are hiring to inspect the air barrier prior to concealment and provide a report on any deficiencies and corrections at the framing or insulation inspection.
- All permanently installed **lighting fixtures shall contain only *high-efficacy* sources**, except kitchen appliance fixtures.
- Permanently installed lighting fixtures shall be controlled with a **dimmer, occupant sensor control or another control** installed or built into the fixture, except for bathrooms, hallways, exterior lighting, or safety/security lighting.
- All **heating and cooling equipment** shall be **sized** such that the total sensible capacity of the cooling equipment does not exceed the total sensible load by more than 25% for cooling-only applications, 40% for heating applications
- Manuals J & S are required for **ALL** methods. Manual D is required for **ALL** ducted heating/cooling systems.
- **A signed air leakage testing report** by an approved third party showing a maximum rate of three air changes per hour at 50 Pascals pressure must be provided to the building official. Testing must be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827.
- All ductwork must pass a **duct leakage test** with a report turned in to the building official by final inspection per IRC Section N1103.3.5. and N1103.3.6.

N1108 (R408) ADDITIONAL EFFICIENCY PACKAGE OPTIONS

N1108.1 (R408.1) Scope. This section establishes additional efficiency package options to achieve additional energy efficiency in accordance with Section N1101.13.5.

N1108.2 (R408.2) Additional efficiency package options. Additional efficiency package options for compliance with Section N1101.13.5 are set forth in Sections N1108.2.1 through N1108.2.5.

N1108.2.1 (R408.2.1) Enhanced envelope performance option. The total building thermal envelope UA, the sum of U-factor times assembly area, shall be less than or equal to 95 percent of the total UA resulting from multiplying the U-factors in Table N1102.1.2 by the same assembly area as in the proposed building. The UA calculation shall be performed in accordance with Section N1102.1.5. The area-weighted average SHGC of all glazed fenestration shall be less than or equal to 95 percent of the maximum glazed fenestration SHGC in Table N1102.1.2.

N1108.2.2 (R408.2.2) More efficient HVAC equipment performance option. Heating and cooling equipment shall meet one of the following efficiencies: 1. Greater than or equal to 95 AFUE natural gas furnace and 16 SEER air conditioner. 2. Greater than or equal to 10 HSPF/16 SEER air source heat pump. 3. Greater than or equal to 3.5 COP ground source heat pump. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the cooling design load. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the heating design load.

N1108.2.3 (R408.2.3) Reduced energy use in service water-heating option. The hot water system shall meet one of the following efficiencies: 1. Greater than or equal to 0.82 EF fossil fuel service water-heating system. 2. Greater than or equal to 2.0 EF electric service water-heating system. 3. Greater than or equal to 0.4 solar fraction solar water-heating system.

N1108.2.4 (R408.2.4) More efficient duct thermal distribution system option. The thermal distribution system shall meet one of the following efficiencies: 1. 100 percent of ducts and air handlers located entirely within the building thermal envelope. 2. 100 percent of ductless thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope. 3. 100 percent of duct thermal distribution system located in conditioned space as defined by Section N1103.3.2.

N1108.2.5 (R408.2.5) Improved air sealing and efficient ventilation system option. The measured air leakage rate shall be less than or equal to 3.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed. Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 cubic feet per minute per watt (0.03 m3 /min/watt) and shall not use recirculation as a defrost strategy. In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT)